

# Man, Land, & Sea

A publication by Guam Coastal Management Program

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## Governor and Lt. Governor MESSAGE

*Håfa Adai!*

Climate change is one of the most critical and pressing issues facing the world today. While there may be some people who dismiss climate change as something far-removed from their daily life, most of us acknowledge how this crisis is affecting our food, health, and home. The challenges we face in addressing climate change are not just our own but ones we share with other island nations throughout Micronesia and the entire Western Pacific.

Scientific studies have shown that the ocean warming in the Western Pacific and the increase in water surface temperature over the last 50 years has greatly exceeded natural predictability. The increase in temperature is more than just warmer waters—it leads to increasing tropical cyclone intensity, a rise in sea levels, ocean acidification, and deterioration of marine ecosystems. With warmer-than-normal waters, we can also see an increase in salt accumulation in soil and freshwater resources leading to disastrous health effects and substantial risks to agriculture production and food supply chains.

As a community, we need to take on a greater role as stewards in protecting Guam's natural resources. Lt. Governor Tenorio and I are committed to facing these issues head-on. Last year, we established the Climate Change Resiliency Commission through Executive Order 2019-19. This Commission was tasked to provide a comprehensive approach to address regional challenges presented by climate change. As we witness life threatening and unparalleled wildfires across the entire U.S. West Coast and record-breaking tropical cyclone development across the Southern and Eastern U.S., one must understand that these are devastating examples of how climate change is currently affecting the health and safety of our people.

We applaud the work of the Bureau of Statistics and Plans' Guam Coastal Management Program, Guam Coral Reef Initiative Program, Guam EPA's Zero Waste Initiatives, and all the projects and programs led by our local government agencies and organizations who work tirelessly to mitigate the effects of climate change. Their work helps to protect and preserve our island's valuable natural resources.

Lt. Governor Tenorio and I invite all of you to be environmental stewards by participating in beach cleanups, purchasing local meat and produce, and properly disposing personal trash. Our small actions to help reduce the impact today will help preserve Guam's natural splendor for tomorrow.

*Si Yu'os Ma'åsel!*

*Lourdes A. Leon Guerrero*  
LOURDES A. LEON GUERRERO  
Maga'hågan Guåhan  
Governor of Guam

*Joshua F. Tenorio*  
JOSHUA F. TENORIO  
Sigundo Maga'låhen Guåhan  
Lieutenant Governor of Guam

“As a community,  
we need to take  
on a greater role  
as stewards in  
protecting  
Guam's natural  
resources.”





# HOW A RAIN GARDEN WORKS



## PITI RAIN GARDEN PROJECT

## BENEFITS OF A RAIN GARDEN

- Rain gardens are shallow depressions with plants, specifically sized and placed to absorb stormwater runoff, the water that flows from your built impervious surfaces such as rooftops, driveways, roads, parking lots when it rains.
- Rain gardens are a beautiful way to use native plants while reducing the amount of polluted runoff from reaching Guam's rivers, streams, ocean and the aquifer.
- Rain gardens filter pollutants such as fertilizers, pesticides, metals and bacteria out of stormwater runoff. This allows clean water to slowly soak back into the ground and recharge groundwater supplies.



FOR MORE INFORMATION, PLEASE CONTACT GCMP  
475-9647 • [BSP.GUAM.GOV](http://BSP.GUAM.GOV)

A MESSAGE BROUGHT TO YOU BY THE GUAM COASTAL MANAGEMENT PROGRAM. PAID FOR FROM GRANT # NA19NOS4190165





# BILL AIMS TO COMBAT LOCAL WILDFIRES

By: The Office of Senator Sabina Perez, Chair Committee on Environment & Bureau of Statistics and Plans' Guam Coastal Management Program (GCMP)

**GovGuam stakeholders collaborate to tighten local arson statute.**



## Senator Perez introduces Bill for Prevention and Prosecution of Wildfire Threats

As a result of these collaborations and discussions, Senator Sabina Perez, Chair of the Committee on Environment, introduced Bill No. 314-35, which seeks to add the burning of "forest land" as an additional prohibited action under Guam's arson statute.

Senator Perez explained, *"The impact of arsonists is not only restricted to our island's terrestrial ecosystem. Wildfires also threaten our marine ecosystem and fishing way of life, because unchecked blazes destroy plants and environmental features that prevent erosion. The resulting runoff flows into Guam's waterways and into our seas, harming Guam's coral reefs and fish stocks. Wildfire arsonists are also destroying our island's fragile coral ecosystem."*

According to the Pacific Fire Exchange, a federally funded consortium of researchers and government entities who exchange data and science on fire-related topics in the Pacific region, 468 wildfires burned 4.7% of our island (6,251 acres, including 290 acres of native forest) in just 2018. In 2019, the Guam Department of Agriculture recorded an increase to 7% of our island being burned by wildfires in just one year. According to the Pacific Fire Exchange and the Guam Department of Agriculture, most wildfires are set by people.

*"The growing climate change emergency, and resulting hotter and drier environment, will increasingly expose our island to similar dangers as those witnessed internationally. Given this reality, we can proactively improve our regulations in an effort to reduce incidents that lead to wildfires. Bill 314-35 strengthens our laws by clearly outlawing the burning of "forest land" and holding arsonists accountable for their reckless actions. We must take a strong stance in order to protect our environment, our lands and waters, and our lives,"* stated Senator Perez.

The legislation is currently in Committee and is expected to receive a public hearing during the first week of October.

For information on how to submit testimony for Bill 314-35, please contact the office of Senator Sabina Perez at 989-2968 or by email at: [office@senatorperez.org](mailto:office@senatorperez.org). A copy of the bill can be downloaded at the Guam Legislature Website.

At the beginning of this year, the world witnessed shocking photos and video of wildfires that tore through Australia and laid unprecedented destruction to the continent's fragile and cherished ecosystem. The scale and ferocity of the blazes devastated entire communities, and scientists warn this summer may bring even more danger. In recent weeks, the world's attention has turned to the West Coast of the United States, as deadly fires spread with explosive force, destroying neighborhoods and forcing tens of thousands to evacuate at-risk areas.

Locally, we must take additional steps to combat a growing problem on Guam – wildfire arson. Wildfires on Guam burn most of the undeveloped southern watersheds on an annual basis. These uncontrolled fires threaten native and endangered species, and expose areas to invasive plant species and grasses, such as swordgrass, which further increases future fire risk. In many cases, these fires are set by unethical hunters who use arson as a tool to frighten and corral their prey.

These examples serve as a deadly wake-up call for leaders around the world, who must improve laws and regulations to prepare for decades of increasing challenges ahead. Strong policies are needed to reduce the carbon emissions warming the atmosphere and creating hotter, drier environments that fuel wildfires.

### Guam Coastal Management Program engages with local stakeholders

In 2019, the Bureau of Statistics and Plans' Guam Coastal Management Program (GCMP) worked in conjunction with the Office of the Attorney General and the University of Hawaii, William S. Richardson School of Law Environmental Law's Field Placement program to provide legal research, analysis and comparison of current laws, rules, policies, and guidelines relating to the protection of Guam's coastal zone and natural resources and to assist in drafting, updating, and revising Guam statutes, administrative rules, guidelines, policies, and procedures relating to the protection of Guam's coastal zone and natural resources.

Earlier agency coordination meetings with various natural resource agencies, such as the Department of Agriculture, National Oceanic Atmospheric Administration, and Guam EPA have indicated that wildland arson is a serious threat to polluting nearshore recreational waters and sources of drinking water in the southern watersheds of Guam in which updating Guam's criminal arson statutes was seen as priority. Unfortunately, Guam's current statute does not adequately address the type of arson that leads to most wildfires.

**"One of GCMP's functions is to work toward the effective administration and enforcement of natural resource related laws."**

-Mr. Edwin Reyes, Administrator, GCMP

Reyes continued that, *"it seems year after year the southern lands are set on fire by arsonists who appear to have no fear of any repercussion from the law. Not only is this practice of setting fire to our lands destructive to our forest, but it also impacts the creatures that depend on the forests for their habitat as well as destroys the natural beauty of the south. Burning the grasslands greatly impacts the nearshore marine environment which suffers due to the excessive sedimentation during heavy rain events"*. The state of California has adopted similar language in their arson laws, which has enabled them to better enforce arson laws against those to intentionally set wildfires. *"It is our hope that updating Guam's arson statute will provide our wildland areas with better protection..."* Reyes concluded.





# Coral Fellow



**UPDATE**  
by Cara Lin

## Understanding Mangrove Protection and Landowner Perspective

Mangroves are a relatively understudied coastal ecosystem in Guam despite their importance and complex ecology. There are at least 4 genera of highly saltwater tolerant mangroves in Guam, although the exact number of species varies by reports based on how “mangrove” is defined. Mangroves do not belong to a single genetic grouping, instead they are defined by their ability to survive in salty conditions and low oxygen soils. Many mangroves possess special salt excreting glands and aerial roots that help them thrive in environments where other plants cannot. Mangroves only exist in coastal areas where the land meets the sea, called the intertidal zone. Some types of mangroves found on Guam include the red mangrove (*Rhizophora*) with its arching “prop roots”, the grey mangrove (*Avicennia*), with “spike roots” that emerge from the ground, and the large leaf mangrove (*Bruguiera*), with its curled “knee roots” that run through the soil. Guam’s mangroves are mostly located in Apra Harbor and along the southern coast. The mangroves serve as a nursery habitat, help stabilize sediments to prevent sedimentation of coral reefs, store massive amounts of carbon, and absorb wave energy. With so many benefits, the mangrove ecosystem is of vital importance to our coastal ecosystems and communities.



***The mangroves serve  
as a nursery habitat,  
help stabilize  
sediments  
to prevent  
sedimentation of  
coral reefs...***

Although mangroves are very important to Guam’s natural environment and human communities, they are threatened by development, pollution, sea level rise and climate change. Protecting our mangroves is important and natural resource managers may use different tools including research and monitoring, outreach and education, legal protections, and restoration and mitigation. Preservation of ecosystems is preferred over restoration when possible. It is difficult to restore the complexity of ecological interactions from the ecosystem’s original state after an

ecological community is degraded, and restoration is more costly than preservation. The carbon captured in the sediments by mangroves may also be released when the mangroves die or are removed, which adds carbon to the atmosphere and contributes to global climate change. As Guam’s Coral Fellow for 2020 to 2022, I have been researching the legal protections for Guam’s mangroves at the federal and local levels. Guam’s marine preserves serve as the primary form of protection for mangroves. Mangroves in the Sasa Bay and Achang Bay Reef Flat Marine Preserves cannot be cut down or damaged according to law. However, mangroves also exist on private properties.





The mangroves outside of our preserves that line the southern coast are especially important to protect, because they are more difficult to restore in the higher wave energy environment and are crucial to preventing shoreline erosion. Stabilization of sediments by mangroves along the southern coast also helps protect the corals in southern Guam from sedimentation.

In the past few months, I have been researching various private land conservation strategies and programs, including those used by the federal government. However, in order to understand how to protect mangroves on private land it is vital to first understand and learn from landowner perspectives. I have been working on this initial step by creating a survey for landowners with input and guidance from natural resource management partners and cultural experts. The goals of the survey include learning about the relationship between landowners and their land, understanding landowner concerns about their property, determining the state and extent of mangroves on private property, and understanding how natural resource managers can best assist landowners in protecting their land while protecting vegetation and coastal ecosystem health. We are still seeking input on the survey from community members. After additional input, the draft survey will then be submitted to the University of Guam's Internal Review Board to ensure participant safety and privacy.



***Anyone with mangroves on their property who would be willing to share their experience by participating in the survey is encouraged to contact [cara.lin@doag.guam.gov](mailto:cara.lin@doag.guam.gov)***



## 5TH Annual Assembly of Planners Symposium 2020



**2020 Planners Symposium  
Airing and Streaming on  
Social Media and Local TV Channels**



If you missed this year's planners symposium you can now catch episodes of the 5th Annual Assembly of Planners Symposium held at the Dusit Thani Guam Resort on February 20, 2020. All 9 episodes air on the government channel GTA Channel 16 and Docomo Channel 116. You can also view the episodes on the Guam Coastal Management Program's YouTube Channel or on our website at [bsp.guam.gov](http://bsp.guam.gov). The theme of this year's symposium was "Creating a Clear Vision in a Changing Climate," and featured panelists and presenters in three main tracks: Flood Control, Land and Zero Waste initiatives. Also featured were presentations on the Guam Forest System Plan, a report on Public Access to beaches and an onsite demonstration and presentation of the Zero Waste Guam Working Group's Biosolids Pilot Project.





# Guam Climate Change Resiliency Commission

*Evangeline Lujan and Dr. Romina King*

Guam's Climate Change Resiliency Commission (CCRC) was established through Executive Order 2019-19. The objective of the CCRC is to develop an integrated strategy to build resilience against the adverse impacts of climate change.

The CCRC is chaired by Evangeline Lujan, a senior regulatory analyst at the Guam Water Authority with over 30 years of experience in natural resource management.

The newly completed technical report, ***"Vulnerability Assessment of Built Infrastructure near Coastal Bays using Three Sea Level Rise (SLR) Scenarios – Guam"***, available at <https://bsp.guam.gov/guamccva/>, will guide the CCRC in the development of the integrated strategy. The report uses Geographic Information Science/Systems (GIS) to calculate the percentage of critical infrastructure, such as the physical networks of water, power, transportation, and Government buildings that would be affected in three scenarios – a three foot SLR, five foot SLR, and a ten foot SLR. Guam is expected to see a three-foot SLR by the end of the century.

It also looks at the Social Vulnerability of Guam, using methodology from the Center for Disease Control and 2010 US Census data for Guam, to identify the most vulnerable villages on Guam, which is extremely relevant in these COVID-19 times.



Researchers found a significant relationship between socio-economic status and vulnerability. Communities of color with lower socio-economic statuses appear to be the most vulnerable. Essentially, increasing the socioeconomic status of Guam's communities will aid in decreasing overall social vulnerability to climate change.

### The main recommendations of the technical report for the development of an adaptation plan are:

- Address poverty and ideas to increase/improve livelihood opportunities and quality of life.
- Explore nature-based solutions to maintain healthy ecosystem services and reduce exposure and vulnerability of the built environment.
- Strengthen governance frameworks and alliances for adaptation.
- Research options to reduce the risk to human health and safety.
- Examine financial sustainability options to improve social safety nets for businesses and individuals.

The report was prepared by Dr. Romina King, Assistant Professor of Geography-University of Guam, University of Guam's Lead – Pacific Islands Climate Adaptation Science Center and Vice-Chair for Guam Climate Change Resiliency Commission; Kaylyn Baustista, MSc, a research associate at the Water and Environmental Research Institute of the Western Pacific (WERI), UOG; Marcel Higgs, Research Assistant – Pacific Island Adaptation Science Center; and Edward Leon Guerrero, MA, a research assistant at UOG.





## The Climate Change Resiliency Commission (CCRC) is a member of Governor's Guam Green Growth (G3) Initiative.

Climate Change is a cross cutting issue that was included in Governor Lou Leon Guerrero Guam Green Growth (G3) for sustainable development. Members of the CCRC were invited to lead the effort for United Nations Sustainable Development Goal Number 13. Climate Actions.

The main goal of the SDG 13 is to take urgent action to combat Climate Change and its impacts on Guam. Some of the goals identified by the CCRC for G3 are:

- Create a dynamic multi-sector Climate Change Resilience Plan by 2021
- Reduce Poverty Rate
- Create a Sustainability Financing Plan for Climate Change Impacts
- Complete a Vulnerability Assessment on Natural Resources
- Improve Climate Literacy
- Utilize Natural Based Solutions and update building codes that reflect increase impacts from climate change
- Reduce Wildland Fires
- Reduce Emissions
- Increase Engagement in effectively managing Guam's Natural Resources



The CCRC hopes to meet soon to develop a comprehensive Climate Change and Resiliency Strategy and begin the action items listed in the G3 Initiative.

**The CCRC invites the public to take this mini-quiz to self-assess their level of knowledge of climate change:**

<https://www.nytimes.com/interactive/2017/06/09/climate/drawdown-climate-solutions-quiz.html?mtrref=www.google.com&assetType=REGIWALL>

# First Responders

## RECEIVE COVID-19 SUPPLIES



The Guam Police Department Officers, Department of Parks and Recreation Park Rangers, Department of Corrections Correction Officers, Department of Agriculture Conservation Officers, and the Attorney General's Office Investigators received over the last week

additional Covid 19 supplies. The supplies were provided by the Bureau of Statistics and Plans (BSP) using funding under a federal grant earmarked for criminal justice agencies. **Among the supplies picked up were N95 Masks, Nitrile Gloves, Isopropyl Rubbing Alcohol, Hand Sanitizer, Sani-cloth (germicidal wipes), 10 x 10 Commercial canopy, Fit Test Kits and Fit Test Kits refill drops.**



The \$2.9 million U.S. Department of Justice Coronavirus Emergency Supplemental Funding Program grant was secured in April



2020 by the Bureau of Statistics and Plans (BSP). The funding became available as part of CARES legislation to help public safety agencies in their response to the COVID-19 pandemic. BSP Director, Tyrone J. Taitano stated **"Four ambulances were**

**secured for GFD. The first one was received in July and immediately put into service, and the remaining three (3) ambulances will be put into service by GFD this week."**

Previously, Covid 19 supplies, funded by this grant, had been provided to Customs Officers, Probation Officers, Court Marshals, and Juvenile Justice Officers. BSP Director explained that this is just the beginning of the supplies ordered utilizing this grant. Taitano said, **"more is coming down the pipeline for our first responders over the next few weeks."**





**Man, Land, and Sea  
Newsletter  
September 30, 2020**

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guam-coastal-management-program/](https://bsp.guam.gov/guam-coastal-management-program/)

**Guam Bureau of Statistics and Plans**

**THE  
DATA  
HUB**

WITH  
**TYRONE  
TAITANO**

**Newstalk**



6:30 pm Tuesdays



# Thank You

## Si Yu'us Ma'åse Salamat Po

ありがとうございました Kinissou Chapwur

Ke Kmal Mesaul 감사합니다 Kalahngan

谢谢 Kom̄mooltata Kulo Kamagar ขอบคุณ

## 2020 Census of Guam

## Thank you GUAM ...

### Together we made a difference.

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